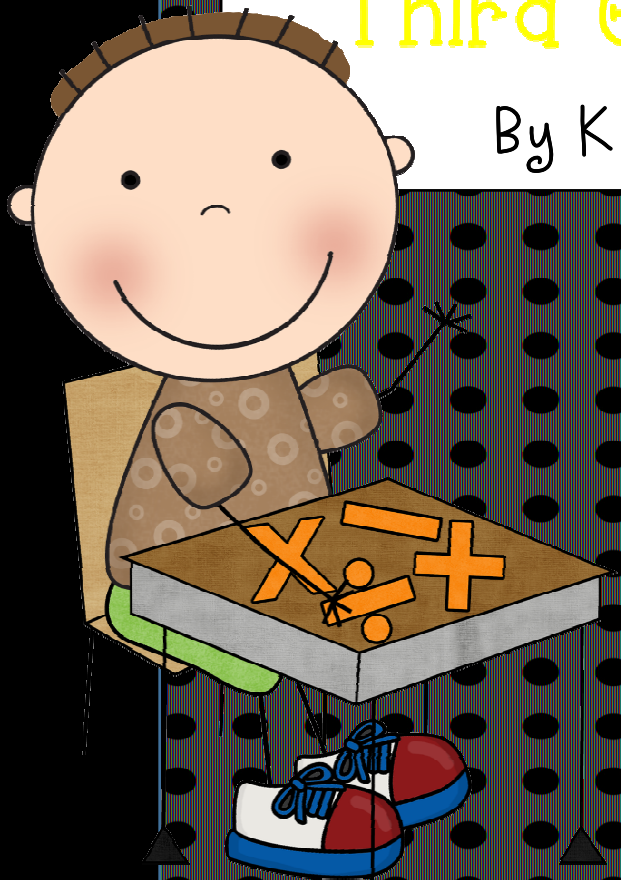


# Multiplication & Division Notebook

Third Grade CCSS

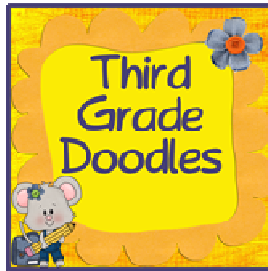
By Kathy Olenczuk



Interactive  
Reference  
Notebook

By Kathy O.

[www.thirdgradedoodles.blogspot.com](http://www.thirdgradedoodles.blogspot.com)



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Hello Fonts

# GRADE 3 STANDARDS

## Multiplication & Division

- 3.OA.1 Interpret products of whole numbers (e.g., interpret  $5 \times 7$  as the total number of objects in 5 groups of 7 objects each).
- 3.OA.2 Interpret whole number quotients of whole numbers (e.g. interpret  $56/8$  as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each).
- 3.OA.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays and measurement quantities (by using drawings & equations with a symbol for the unknown number to represent the problem).
- 3.OA.4 Determine the unknown whole number in a multiplication or division equation relating three whole numbers. (determine the unknown number that makes the equation true in each of the equations:  $8 \times a = 48$ ,  $5 = a/3$ ,  $6 \times 6 = a$ )

- 3.OA.5 Apply properties of operations as strategies to multiply & divide (commutative:  $4 \times 6 = 6 \times 4$ ; associative:  $3 \times 5 \times 2$ ; distributive:  $8 \times 7 = 8 \times (5 + 2) = 8 \times 5 + 8 \times 2$ )
- 3.OA.6 Understand division as an unknown factor problem (find  $32/8$  by finding the number that makes 32 when multiplied by 8)
- 3.OA.7 Fluently multiply & divide within 100, using strategies such as the relationship between multiplication & division or properties of operations. By the end of third grade know all products of 2 one-digit numbers.
- 3.OA.8 Solve 2-step word problems. Represent these problems using equations with a letter standing in for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation (rounding).
- 3.MD.2 Solve 1-step multiplication/division word problems involving mass or volume given in same units.
- 3.OA.4 Identify arithmetic patterns (multiplication table) and explain them using properties of operations (observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends).
- 3.NBT.3 Multiply 1-digit whole numbers by multiples of 10 in the range 10-90, using strategies based on place value and properties of operations.



# Skills Included

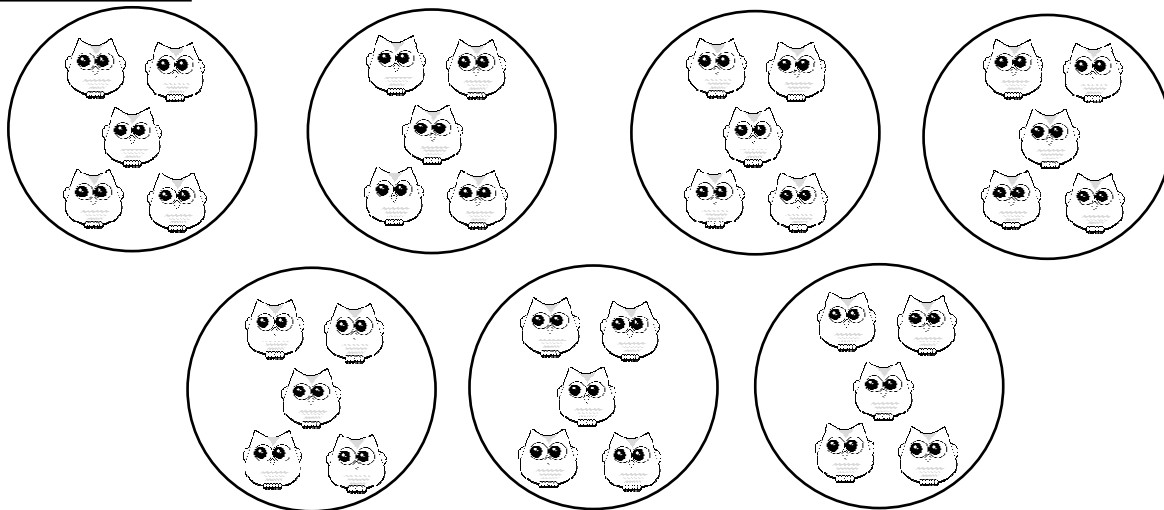
- Interpreting Products of Whole Numbers
- Interpreting Quotients of Whole Numbers
- Solving Multiplication & Division Word Problems
- Properties of Multiplication
  - Commutative, Distributive, Associative
  - Solving division using the unknown factor
- Multiplication & Division Strategies
  - Fact Families
  - Repeated Addition/Skip Counting
  - Landmark/Friendly Numbers
  - Using Partial Products
  - Doubling & Halving
  - Breaking Factors Down
  - Repeated Subtraction/Dealing Out
  - Multiplying Up
- Solving 2-step Word Problems
- Patterns on the Multiplication Table
- Multiplying by Ten

# MULTIPLICATION

3.OA.1 I can interpret products of whole numbers.

$$7 \times 5 = 35$$

7 groups of 5 is equal to 35 total objects.



$$5 + 5 + 5 + 5 + 5 + 5 + 5 = 35$$

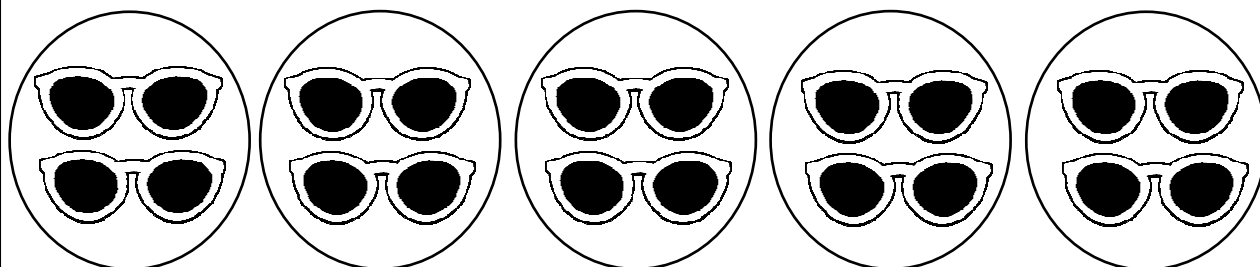
Draw a picture to represent the following equations:

$$3 \times 7$$

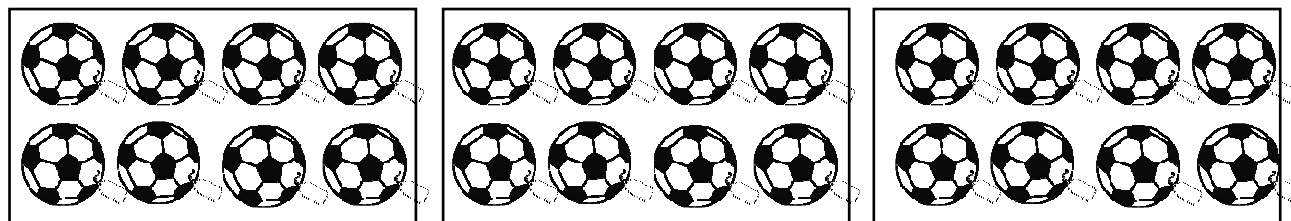
$6 \times 4$

$9 \times 6$

What equation is represented by the following picture?



What equation is represented by the following picture?

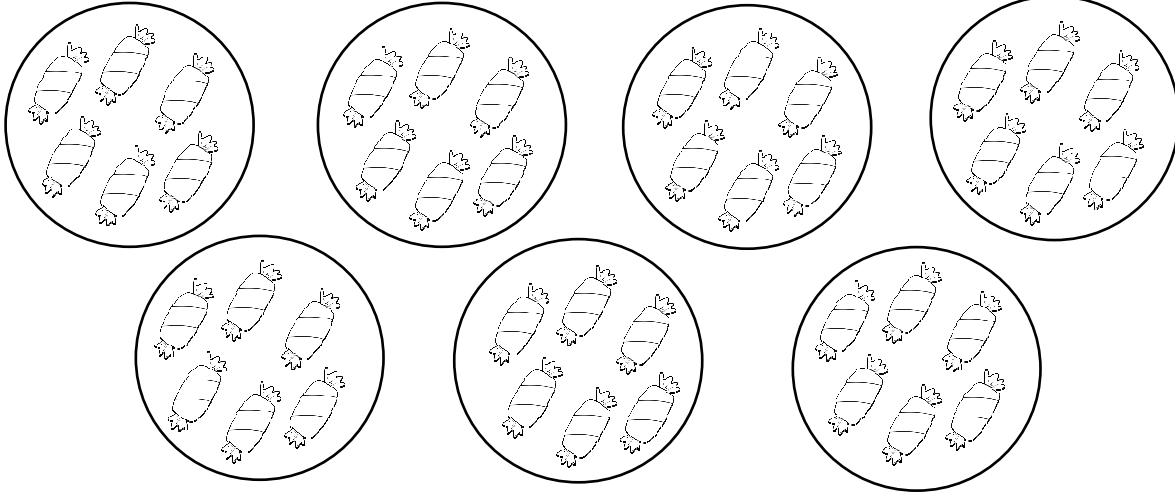


# DIVISION

3.OA.2 I can interpret quotients of whole numbers.

$$42 \div 7 = 6$$

42 candies can be divided equally among 7 students. Each student gets 6 candies.



$$6 + 6 + 6 + 6 + 6 + 6 + 6 = 42$$

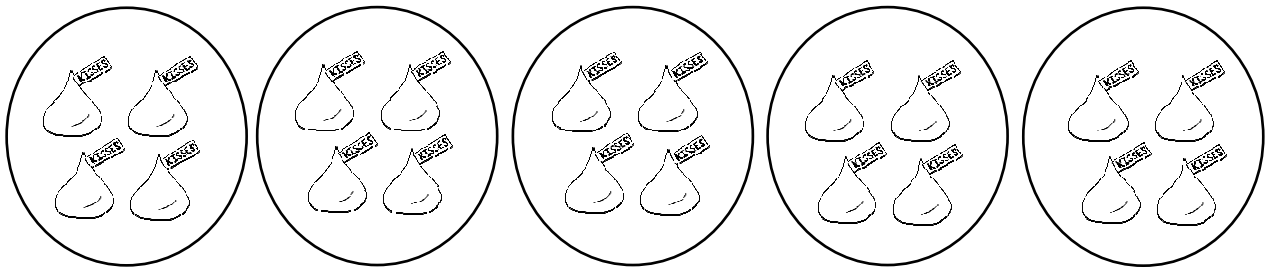
Draw a picture to represent the following equations:

$$25 \div 5$$

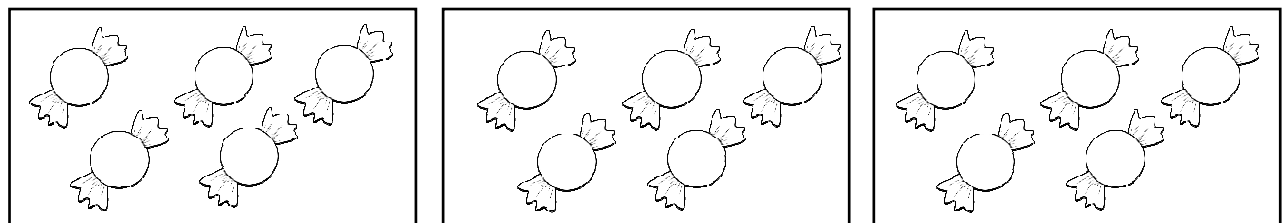
$$25 \div 5$$

$$21 \div 3$$

What equation is represented by the following picture?



What equation is represented by the following picture?



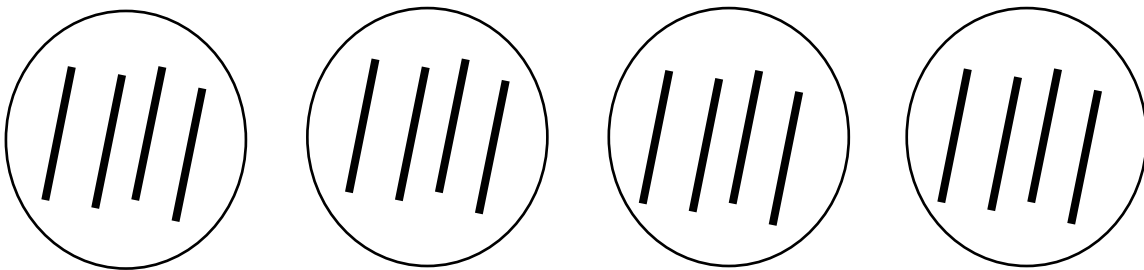
# WORD PROBLEMS

3.OA.3 I can use multiplication & division to solve word problems.

"Loops & Groups" can be used to solve word problems involving multiplication & division.

John bought 4 packages of licorice. There were 4 pieces of licorice in each package. How many pieces were there in all? Solve:  $4 \times 4 = n$

4 loops...4 in each group:  $4 + 4 + 4 + 4 = 16$



Write an equation that goes with each word problem  
(use "n" as the unknown number).

Draw a "loops & groups" picture to solve the problems:

Nakiya wanted to share 12 cookies with her 3 friends.  
How many cookies can they each have?

Sean ate 2 cupcakes everyday for 7 days. How many cupcakes did he eat in all?

There were 4 rows of chairs in the auditorium . Each row had 25 chairs. How many chairs were there?

The squirrely hid 60 nuts equally among 6 holes. How many nuts were hidden in each hole?

7 children came to the picnic. Each child drank 4 ounces of juice. How many ounces of juice did they drink in all?

# FINDING THE UNKNOWN NUMBER

3.OA.4 I can find the unknown number in a multiplication or division number sentence.

The relationship between multiplication & division can help you to determine the unknown number in an equation. These relationships are often called “fact families.”

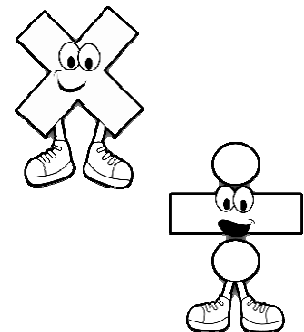
Example:

$$6 \times 8 = 48$$

$$8 \times 6 = 48$$

$$48 \div 6 = 8$$

$$48 \div 8 = 6$$



Find the missing number in the following equations.  
Show your thinking!

$$\underline{\hspace{2cm}} \times 3 = 21$$

$$24 \div 8 = \underline{\hspace{2cm}}$$



$$9 \times 7 = \underline{\hspace{2cm}}$$

$$100 \div \underline{\hspace{2cm}} = 4$$

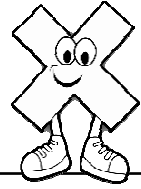
$$100 \div \underline{\hspace{2cm}} = 4$$

$$\underline{\hspace{2cm}} \times 3 = 21$$

$$7 \times \underline{\hspace{2cm}} = 42$$

# PROPERTIES OF MULTIPLICATION

3.OA.5 I can apply properties of operations as strategies to multiply & divide.



## Properties of Multiplication:

**Commutative** (you can reverse the problem without changing the answer):

$$4 \times 7 = 28$$

$$7 \times 4 = 28$$

**Associative** (when multiplying 3 numbers, you can multiply in any order):

$$4 \times (3 \times 2) = 24$$

$$(4 \times 3) \times 2 = 24$$

**Distributive** (lets you multiply a sum by multiplying each addend separately and then adding the products):

$$4 \times 9 = 4 \times (6 + 3)$$

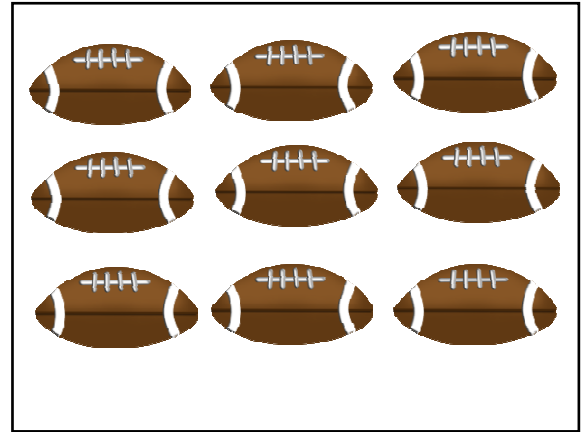
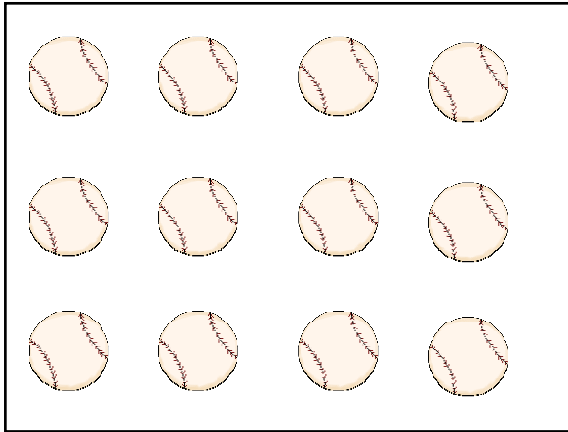
$$4 \times 6 = 24$$

$$4 \times 3 = 12$$

$$24 + 12 = 36$$

Solve the problems on the following page using Commutative, Associative, or Distributive Properties:

Write two equations to go with the following pictures:



\_\_\_\_\_

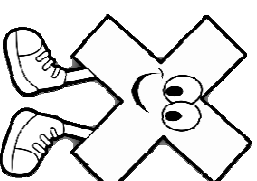
Solve the following equations. Show your work!

$$5 \times 4 \times 3$$

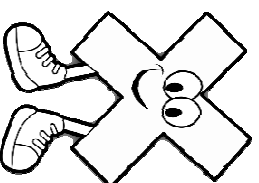
$$2 \times 5 \times 8$$

Solve the following problem using the Distributive Property. Show your work!

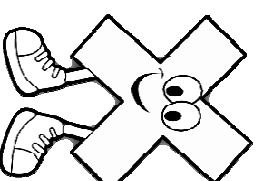
$$9 \times 8$$



Commutative  
Property



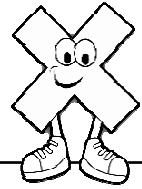
Associative  
Property



Distributive  
Property

# PROPERTIES OF MULTIPLICATION

3.OA.6 I understand that division is an unknown factor problem.



Knowing your multiplication facts can help you to solve division problems!

Example:

I can find the answer to  $32 \div 8$  by first finding the number that makes 32 when it is multiplied by 8.

In other words:  $8 \times ? = 32$ ...

$$8 \times 4 = 32$$

$$\text{So... } 32 \div 8 = 4$$

Another example:

$$81 \div 9$$

$$9 \times ? = 81$$

$$9 \times 9 = 81$$

$$\text{So... } 81 \div 9 = 9$$

Fill in the blanks to solve the following equations:

$$8 \times 7 = 56$$

$$56 \div 8 = \underline{\hspace{2cm}}$$

$$56 \div 7 = \underline{\hspace{2cm}}$$

$$7 \times 9 = 63$$

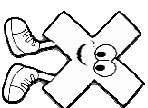
$$63 \div 9 = \underline{\hspace{2cm}}$$

$$63 \div 7 = \underline{\hspace{2cm}}$$

$$25 \times 4 = 100$$

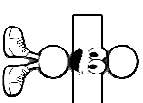
$$100 \div 25 = \underline{\hspace{2cm}}$$

$$100 \div 4 = \underline{\hspace{2cm}}$$



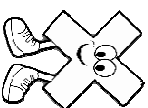
Fact Family:

$$6 \times 4$$



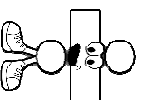
Fact Family:

$$8 \times 8$$



Fact Family:

$$5 \times 7$$



# MULTIPLICATION & DIVISION FLUENCY

3.OA.7 I can fluently solve multiplication & division problems within 100 using various strategies.

Knowing your multiplication facts can help you to solve division problems!

Example:

I can find the answer to  $32 \div 8$  by first finding the number that makes 32 when it is multiplied by 8.

In other words:  $8 \times ? = 32$ ...

$$8 \times 4 = 32$$

$$\text{So... } 32 \div 8 = 4$$

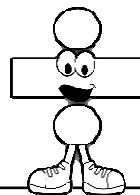
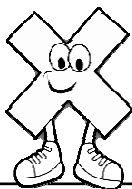
Another example:

$$81 \div 9$$

$$9 \times ? = 81$$

$$9 \times 9 = 81$$

$$\text{So... } 81 \div 9 = 9$$



Fill in the blanks to solve the following equations:

$$8 \times 7 = 56$$

$$56 \div 8 = \underline{\hspace{2cm}}$$

$$56 \div 7 = \underline{\hspace{2cm}}$$

$$7 \times 9 = 63$$

$$63 \div 9 = \underline{\hspace{2cm}}$$

$$63 \div 7 = \underline{\hspace{2cm}}$$

$$25 \times 4 = 100$$

$$100 \div 25 = \underline{\hspace{2cm}}$$

$$100 \div 4 = \underline{\hspace{2cm}}$$

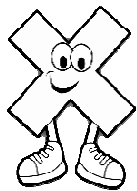
# MULTIPLICATION STRATEGIES

3.OA.7 I can fluently solve multiplication & division problems within 100 using various strategies.

## STRATEGY:

### Repeated Addition /Skip Counting

Multiplication is one number repeated multiple times.



We call this **repeated addition**.  
For example  $6 \times 4 = 6 + 6 + 6 + 6$ .

We can also think of it as **skip counting**.  
For example,  $2 \times 4 = 2, 4, 6, 8$

Use repeated addition to solve the following problems. Show your work.

$$20 \times 6$$

$$15 \times 4$$



# MULTIPLICATION STRATEGIES

3.OA.7 I can fluently solve multiplication & division problems within 100 using various strategies.

## STRATEGY: Landmark or Friendly Numbers

A multiplication problem can be made easier by changing one of the factors to a more friendly (landmark) number, such as ten.

Examples:

$$9 \times 15$$

$$9 + 1 \text{ (group of 15)} = 10$$

$$10 \times 15 = 150$$

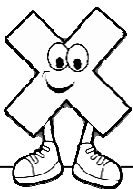
$$150 - 15 = 135$$

$$5 \times 19$$

$$19 + 1 = 20$$

$$5 \times 20 = 100$$

$$100 - 19 = 81$$



Practice this strategy. Solve the following multiplication problems by using landmark numbers. Show your work using the above example as a model.

## Landmark/Friendly Numbers

$$2 \times 19$$

$$7 \times 9$$

$$3 \times 9$$

$$5 \times 7$$

# MULTIPLICATION STRATEGIES

3.OA.7 I can fluently solve multiplication & division problems within 100 using various strategies.

## STRATEGY: Partial Products

Partial Products uses place value and the distributive property to solve multiplication problems.

Examples:

$$7 \times 7$$

$$7 \times (5 + 2)$$

$$7 \times 5 = 35$$

$$7 \times 2 = 14$$

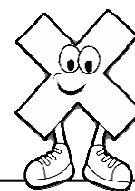
$$35 + 14 = 49$$

$$6 \times 8$$

$$6 \times (4 + 4)$$

$$6 \times 4 = 24$$

$$24 + 24 = 48$$



Practice this strategy. Solve the following multiplication problems by using partial products. Show your work using the above example as a model.

$$4 \times 7$$

$$3 \times 15$$

$$8 \times 5$$

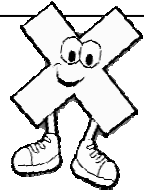
$$2 \times 36$$

Partial Products

# MULTIPLICATION STRATEGIES

3.OA.7 I can fluently solve multiplication & division problems within 100 using various strategies.

## STRATEGY: Doubling & Halving



When one factor in a multiplication equation is doubled and the other factor is divided in half, the answer to the equation will remain the same.

Examples:

$$1 \times 16 = 16$$

$$2 \times 8 = 16$$

$$4 \times 4 = 16$$

$$8 \times 2 = 16$$

$$16 \times 1 = 16$$

$$5 \times 4 = 20$$

$$10 \times 2 = 20$$

$$20 \times 1 = 20$$

Practice this strategy. Solve the following multiplication problems using the double and halve strategy. Show your work using the above example as a model.

## Doubling & Halving

$$2 \times 18$$

$$8 \times 3$$

$$4 \times 4$$

$$4 \times 14$$

# MULTIPLICATION STRATEGIES

3.OA.7 I can fluently solve multiplication & division problems within 100 using various strategies.

## STRATEGY: Breaking Factors Down

Breaking factors down into smaller factors can make multiplication equations easier to solve.

Examples:

$$6 \times 4$$

$$6 \times (2 \times 2)$$

$$(6 \times 2) + (6 \times 2)$$

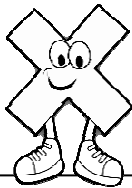
$$12 + 12 = 24$$

$$4 \times 8$$

$$4 \times 4 \times 2$$

$$16 \times 2 = 32$$

$$2 \times 2 \times 2 \times 2 \times 2 = 32$$



Practice this strategy. Solve the following multiplication problems by breaking factors down. Show your work using the above example as a model.

## Breaking Factors Down

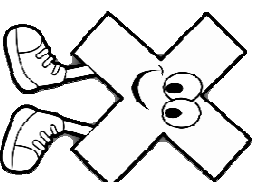
$$12 \times 4$$

$$6 \times 9$$

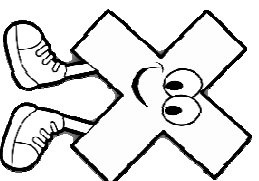
$$5 \times 12$$

$$8 \times 5$$

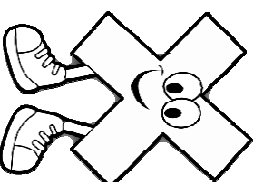




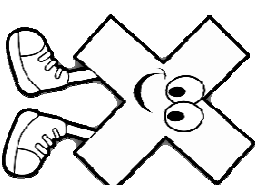
Repeated  
Addition



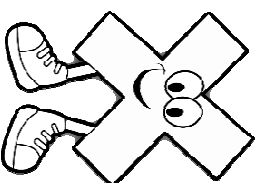
Landmark  
Numbers



Partial  
Products



Doubling &  
Halving



Breaking  
Factors Down

# DIVISION STRATEGIES

3.OA.7 I can fluently solve multiplication & division problems within 100 using various strategies.

## STRATEGY:

### Repeated Subtraction/Dealing Out

Repeated subtraction and dealing out are two beginning strategies for solving division equations.

Repeated Subtraction Example:

$$30 \div 5$$

$$30 - 5 = 25 \text{ (1)}$$

$$25 - 5 = 20 \text{ (2)}$$

$$20 - 5 = 15 \text{ (3)}$$

$$15 - 5 = 10 \text{ (4)}$$

$$10 - 5 = 5 \text{ (5)}$$

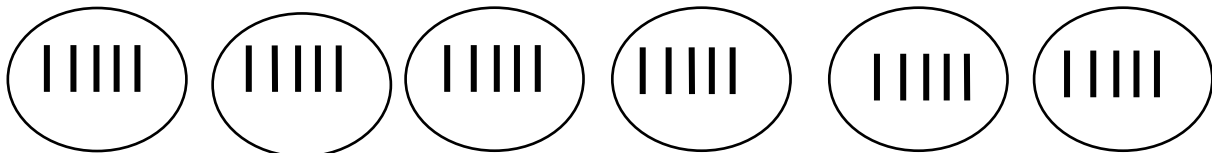
$$5 - 5 = 0 \text{ (6)}$$

$$30 \div 5 = 6$$

Dealing Out Example:

$$30 \div 6$$

Make six loops and deal out 30 to each, one at a time. The answer is the number in each loop!



Practice this strategy. Solve the following division problems using the repeated subtraction or dealing out. Show your work using the above example as a model.

## Repeated Subtraction & Dealing Out

$$12 \div 2$$

$$15 \div 3$$

$$24 \div 6$$

$$18 \div 9$$

# DIVISION STRATEGIES

3.OA.7 I can fluently solve multiplication & division problems within 100 using various strategies.

## STRATEGY: Multiplying Up

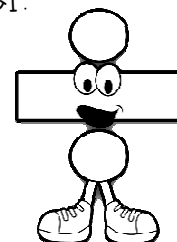
Multiplying up allows you to use your knowledge of multiplication and partial products to solve division equations.

Examples:

$$\begin{aligned}48 \div 4 \\4 \times 10 &= 40 \\4 \times 2 &= 8 \\(40 + 8 &= 48) \\10 + 2 &= 12 \\48 \div 4 &= 12\end{aligned}$$

$$\begin{aligned}56 \div 4 \\4 \times 10 &= 40 \\4 \times 4 &= 16 \\(40 + 16 &= 56) \\10 + 4 &= 14 \\56 \div 4 &= 14\end{aligned}$$

Practice this strategy. Solve the following division problems using the multiplying up strategy. Show your work using the above example as a model.



$$56 \div 4$$

$$72 \div 4$$

$$96 \div 3$$

$$38 \div 2$$

Multiplying Up

# TWO-STEP WORD PROBLEMS

3.OA.8 I can solve 2-step word problems using multiplication & division.

Some word problems have more than one step and operation involved in solving them. Solve each step with an equation, using a letter or symbol to represent the unknown number. Often, drawing a picture can also be helpful.

Example:

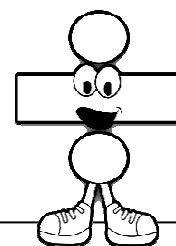
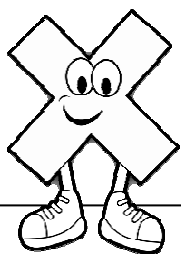
Jose had 4 packs of baseball cards. Inside each pack was 10 cards. He gave 1 pack to his friend Bill. How many baseball cards does Jose have left?

Step 1:  $4 \times 10 = 40$

Step 2:  $1 \text{ pack} = 10$

Step 3:  $40 - 10 = 30$

Jose has 30 baseball cards!



Practice this strategy. Solve the following division problems using the multiplying up strategy. Show your work using the above example as a model.

50 people were coming to the talent show. The auditorium was already set up with 2 rows of chairs. Each row had 10 chairs. How many more rows of chairs are needed?

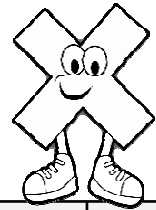
Jonna sold 5 cases of cookies last week and 6 cases this week. Each case holds 10 boxes of cookies. If Jonna sells 7 boxes next week, how many boxes of cookies will she have sold?

Mom needs 3 cans of tomatoes for her special soup. Each can contains 10 ounces of tomatoes. If mom makes 4 pots of soup, how many ounces of tomatoes will she use?



# PATTERNS IN MULTIPLICATION

3.OA.4 I can identify arithmetic patterns and explain them using properties of operations.



0	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

On the following page, list several patterns that you notice about the above multiplication chart.

Patterns on the Multiplication Chart

Pattern:

Pattern:

Pattern:

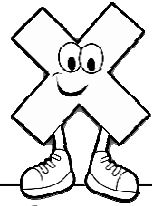
Pattern:

Explain why 4 times any number is always an even number:

Explain why 5 times any number is sometimes odd and sometimes even:

# MULTIPLES OF TEN

3.NBT.3 I can multiply 1-digit numbers by multiples of ten in the range of 10-90.



Knowledge of place value can help you to solve multiplication problems involving tens.

Example:

If you know that  $6 \times 7 = 42$

Then you can multiply:

$$6 \times 70 = 420$$

$$60 \times 7 = 420$$

$$60 \times 70 = 4,200$$

Simply add up the zeros in each factor and add that many zeros to the product!

Practice this strategy. Solve the following multiplication problems using the above strategy.

$$4 \times 50 = \underline{\hspace{2cm}}$$

$$60 \times 30 = \underline{\hspace{2cm}}$$

$$8 \times 30 = \underline{\hspace{2cm}}$$

$$40 \times 40 = \underline{\hspace{2cm}}$$

$$70 \times 3 = \underline{\hspace{2cm}}$$

$$80 \times 40 = \underline{\hspace{2cm}}$$

$$6 \times 90 = \underline{\hspace{2cm}}$$

$$20 \times 10 = \underline{\hspace{2cm}}$$

# Thank you for your purchase!!

Please let me know if you have any  
questions or special requests!!

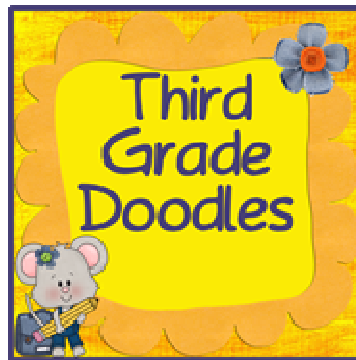
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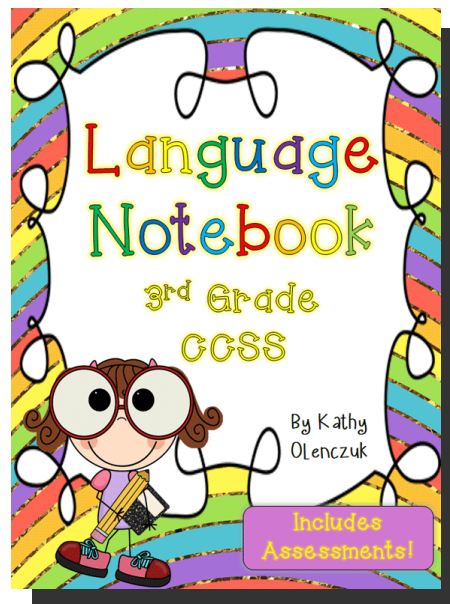
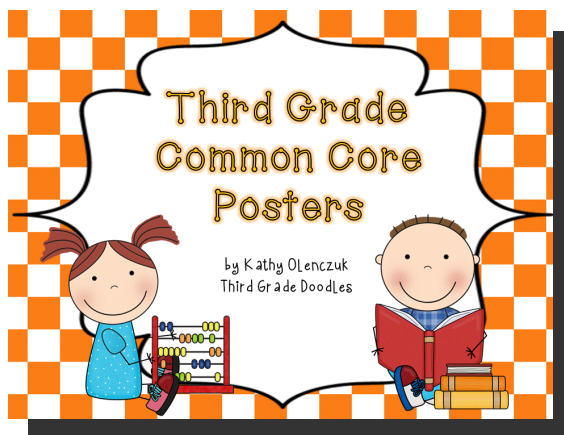
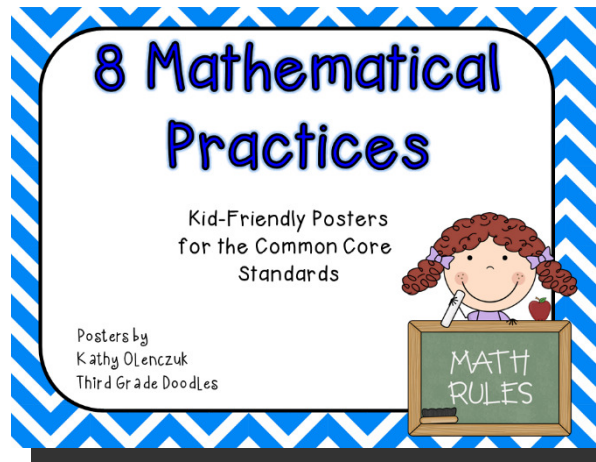
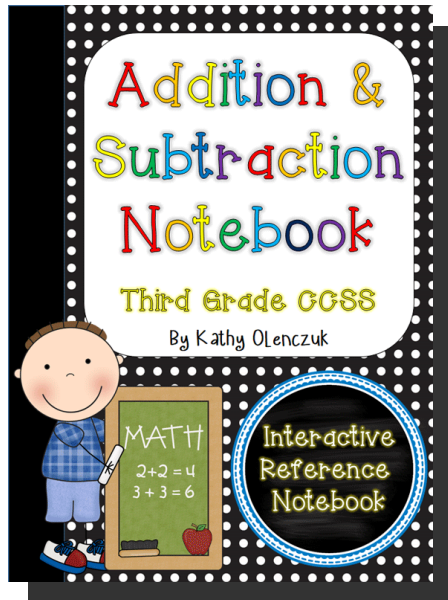
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